

REMARKS

REMARKS ON AMENDMENTS

With the foregoing amendments to the specification, Applicants amend the Related Applications section to include the U.S. patent application numbers of concurrently filed, related applications. Applicants add a sentence to paragraph 156. Support for this sentence can be found in claim 1 as originally filed, which recites, “distributing the snapshot of the source volume across the more than one processor in the virtualization layer.” Applicants also modify the Summary of the Invention section to reflect changes to the independent claims. Support for the amendments to the Summary of the Invention section is noted below in the remarks regarding amendments to the independent claims.

By this amendment Applicants add claims 31 and 32 and cancel, without prejudice or disclaimer, claims 18 and 25. Additionally, Applicants amend claims 1-5, 7-17, 19, 23-24, and 26-30 to further clarify Applicants’ invention and to place the claims in a format suitable for allowance. Support for the additional claims and amendments to claims 1-5, 7-17, 19, 23-24, and 26-30 can be found in Applicants’ specification at FIG. 13 and paragraphs 151 through 164.

For example, Applicants amend the claims to eliminate the expression “intermediate snapshot.” This expression is replaced with “partition snapshot” to more clearly reflect the concept disclosed at paragraph 156, where the term “partition snapshot” is used and which states, “...a snapshot copy may be made of each partition.” Applicants also amend the claims to more particularly differentiate between a partition snapshot and an overall snapshot. Support for this amendment may also be found at paragraph 156, which states “...partition snapshots may then be combined to

create a complete point-in-time copy of the virtual volume...” and may be found in claims 15 and 20 as filed, which refer to an “overall snapshot.” In addition, Applicants change the expression, “source volume,” to “virtual volume” to simplify the claim language. Support may be found for this amendment in the claim 1 as originally filed, which recites “the source volume is a virtual volume.”

Applicants amend claim 2, which now recites, “...distributing the overall snapshot of the virtual volume across more than one processor in the virtualization layer,” to include the limitation of claim 1 as originally filed, “distributing the snapshot of the source volume across the more than one processor in the virtualization layer.” Applicants similarly amend claims 12, 19, and 29.

Additionally, claim 3 now recites, “...wherein each of the set of partition snapshots is created by the processor to which the corresponding object is distributed.” Support for this amendment may be found at paragraph 90 where it is disclosed that the VSM, which is on the processor, creates the snapshots. FIG. 4 shows VSM's located in the storage processors, which are part of the virtualization layer. Applicants similarly amend claims 9 and 13.

Support for new claim 31 may be found in claim 1 as originally filed, which states, “...generating a snapshot of the source volume that is a point in time copy containing state information about a state of the source volume when the snapshot is generated.” Support for new claim 32 may be found in FIG. 13, which shows a change log volume for each partition snapshot, and in claims 15 and 17 as originally filed. Claim 15 as originally filed refers to a change log volume for each intermediate snapshot, now referred to as partition snapshot, and claim 17 as originally filed recites, “...storing [in

each change log] changes made to the corresponding intermediate point-in-time copy....”

Accordingly, no new matter is introduced by these amendments or by the new claims.

REMARKS ON EXAMINER'S REJECTIONS

In response to the Office Action mailed October 23, 2006, Applicants respectfully request reconsideration. The Examiner rejected claims 3-4, 13-22, 24-25, and 28-29 under 35 U.S.C. § 112, claims 1-30 under 35 U.S.C. § 101, claims 1-3, 5-6, 8-13, 15-24, 26-28, and 30 under 35 U.S.C. § 102, and claims 4, 14, 25, and 29 under 35 U.S.C. § 103. By this amendment, Applicants cancel claims 18 and 25 and therefore the rejection of claims 18 and 25 are now moot. Claims 1-17, 19-24, 26-30 and new claims 31 and 32 remain pending. Claims 1, 8, 15, 23 and 27, are independent.

Rejections Under 35 U.S.C. § 112

The examiner rejected claims 3-4, 13-22, 24-25, and 28-29 under 35 U.S.C. § 112 for failing to enable one of ordinary skill in the art to make and use an “intermediate snapshot,” pointing out that the only mention of “intermediate snapshot” is in the claims and Summary of Invention section. See Office Action at 3. As noted above, Applicants have amended the claims and the Summary of the Invention section to eliminate the expression “intermediate snapshot” so that the term “partition snapshot” is used consistently throughout the application. In view of these amendments, Applicants respectfully request the withdrawal of the rejections under 35 U.S.C. § 112.

Rejections Under 35 U.S.C. § 101

The Examiner rejected claims 1-30 under 35 U.S.C. § 101 as being directed to non-statutory subject matter due to deficiencies in the independent claims. See Office Action at 3-5. While Applicants disagree with the Examiner's conclusions, Applicants have amended independent claims 1, 8, 15, 23, and 27 in the interest of expediting examination.

Claims 1, 8, 23, and 27

The Examiner objected to claims 1, 8, 23, and 27 for lacking a final, conclusionary step which sets forth a practical application yielding a useful, concrete, and tangible result and requested appropriate correction. See Office Action at 4. In response thereto, Applicants have amended claim 1 to recite, "A method for creating a snapshot of a virtual volume containing stored data..." Claim 1 now clearly indicates that the stages are related for a practical application, i.e. for creating a snapshot of a virtual volume. Claims 8, 23, and 27 have been similarly amended. In addition, Applicants maintain that the recited method of claims 1 and 8, and systems of claim 23 and 27 yield useful, concrete, and tangible results. Claims 1, 23, and 27 yield an overall snapshot and claim 8 yields an overall snapshot and change log volumes.

The Examiner also rejected claim 27 as not being limited to physical articles or objects, which are structurally and functionally interrelated to the program in such a manner that would enable the program to act as a computer component and realize any functionality. Office Action at 3-4. The foregoing arguments with respect to claims 1, 8, 23, and 27 also demonstrate that the computer readable medium of claim 27 enables the program to realize the functionality of creating an overall snapshot of a virtual

volume. In addition, Applicants have amended claim 27 to read, “a tangibly-embodied computer readable medium...” to make clear that all embodiments of the invention must be tangible.

For these reasons, the rejection of claims 1, 8, 23, and 27 under 35 U.S.C. § 101 should be withdrawn as well as the rejection under 35 U.S.C. § 101 of claims 2-17, 23-24, and 26-30, which depend therefrom.

Claim 15

The Examiner rejected system claim 15 as not limited to any physical articles or objects and suggested amending claim 15 in the same manner as claim 1 to recite a useful, concrete, and tangible result. Office Action at 4. While Applicants disagree with this conclusion, in the interest of expediting examination, Applicants have amended claim 15 similarly to claim 1. Claim 15 is now directed to “a system for creating a snapshot of a virtual volume,” and thereby has a useful, concrete, and tangible result – an overall snapshot object.

For this reason, the rejection of claim 15 under 35 U.S.C. § 101 should be withdrawn as well as the rejection under 35 U.S.C. § 101 of claims 16-17 and 19-22, which depend therefrom.

Rejections Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1-3, 5-6, 8-13, 15-24, 26-28, and 30 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,981,114 by Wu et al. (“Wu”). Office Action at 5. This rejection should be withdrawn because the independent claims 1, 8, 15, 23, and 27, so rejected, patentably distinguish over Wu. To properly establish that a prior art reference anticipates a claimed invention under 35

U.S.C. § 102, each and every element of the claims in issue must be found, either expressly described or under principles of inherency, in the single prior art reference. See MPEP § 2131. Wu does not disclose each and every element of independent claims 1, 8, 15, 23, and 27.

Claims 1, 8, 15, 23, 27

First, Wu does not disclose or suggest, "...wherein each one of the objects corresponds to a different portion of the virtual volume, and wherein the objects are distributed across more than one processor in a virtualization layer," as recited in claims 1, 8, 15, 23, and 27. The Examiner cites, in part, to FIG. 1 of Wu as disclosing this element of Applicants' claims. See Office Action at 6. However, Wu, in FIG. 1 or otherwise, does not disclose or suggest a method for virtualization wherein objects corresponding to a different portion of the virtual volume are distributed across more than one processor. While FIG. 1 shows multiple servers, which each may have multiple processors, there is no disclosure or suggestion in Wu of how objects corresponding to different portions of the virtual volume would be distributed across multiple processors in a server, or across the multiple servers of FIG. 1.

Second, Wu does not disclose or suggest, "generating an overall snapshot of the virtual volume from the set of partition snapshots," as recited in claims 1, 8, 23, and 27 or "an overall snapshot object of the virtual volume comprising references to each partition snapshot," as recited in claim 15. Indeed, the Examiner concedes that Wu does not disclose "combining intermediate snapshots from each processor to generate the snapshot of the source volume." Office Action at page 14.

Additionally, Applicants disagree with the Examiner's equating of Applicants' intermediate snapshots (renamed by this amendment to partition snapshots) with Wu's snapshots of the same volume created at different times. See Office Action at 11 citing Wu at Col. 5 lines 46-51 and Col. 6 lines 38-44. Applicants' partition snapshots are patentably distinct from Wu's snapshots of the same device at different times. Applicants' partition snapshots are snapshots of portions of the virtual volume, and not snapshots of the same portion of a virtual volume taken at different times as in Wu. See Specification at paragraph 156 and FIG. 13. Applicants' FIG. 13 shows an exemplary embodiment of "partition" snapshots (elements 1310, 1312, and 1314), each corresponding to a portion of virtual volume object A, and an "overall snapshot object" 1303 of virtual volume object A, having a reference to intermediate snapshots 1310, 1312, and 1314.

While Wu discloses that the volume manager may create a snapshot corresponding to a portion of a logical volume, Wu does not disclose generating an overall snapshot from a set of those snapshots corresponding to a virtual volume. See Wu at Col 4 lines 51-60. In the rejection of claim 4, the Examiner concedes that Wu does not explicitly disclose, "combining intermediate snapshots from each processor to generate the snapshot of the source volume." Wu, therefore, does not disclose or suggest "generating an overall snapshot of the virtual volume from the set of partition snapshots," as recited in claims 1, 8, 23, and 27 or "an overall snapshot object of the virtual volume comprising references to each partition snapshot," as recited in claim 15.

For at least these reasons, claims 1, 8, 15, 23 and 27 are patentably distinct from Wu and the rejection under 35 U.S.C. § 102 should be withdrawn as well as the rejection of claims 2-3, 5-6, 8-13, 16-22, 24, 26, 28, and 30, which derive therefrom.

Claims 2, 12, 19, and 29

Claims 2, 12, 19, and 29 are patentably distinct from Wu in their own right, in addition to the foregoing reasons. In the rejection of claim 2, the Examiner has incorrectly equated Applicants' "distributing the overall snapshot of the virtual volume across the more than one processor in the virtualization layer" with Wu's accessing the same snapshot on a storage device by multiple servers. See Office Action at 6. Access by multiple servers to the same snapshot is not "distributed" consistent with Applicants' use of "distributed" meaning that multiple processors each have their own copy of the overall snapshot. This meaning of "distributed" is consistent with an accepted meaning -- to give out to members of a group. See Merriam-Webster's Collegiate Dictionary, 11th Edition. Although Wu discloses that the virtual volume is distributed across a plurality of storage devices, and that the snapshots may be stored on the storage device they represent (Wu at Col 4 lines 51-60), Wu does not disclose or suggest that *the snapshot is distributed over multiple processors in the virtualization layer*. Claims 12, 19, and 29 all carry a limitation related to distributing the overall snapshot across more than one processor.

For at least these reasons, claims 2, 12, 19, and 29 are patentably distinct from Wu and the rejection under 35 U.S.C. § 102 should be withdrawn.

Rejections Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 4, 14, 25, and 29 as being unpatentable over Wu in view U.S. Patent Application No. 2003/0191911 by Kleinschnitz Jr. et. al. ("Kleinschnitz") and claim 7 as being unpatentable over Wu in view U.S. Patent No. 6,173,293 by Thekkath et. al. ("Thekkath") under 35 U.S.C. § 103(a). To establish a prima facie case of obviousness, three basic criteria must be met. MPEP § 2143. First, there must be some suggestion or motivation, either in the reference or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings. Id. Second, there must be a reasonable expectation of success. Id. Finally, the prior art reference as modified must teach or suggest all the claim elements. Id. The rejection of claims 4, 14, 25, and 29 under 35 U.S.C. § 103 should be withdrawn because a prima facie case of obviousness has not been established based on Wu in view of Kleinschnitz where the combination of Wu and Kleinschnitz does not teach or suggest all elements the rejected claims. Similarly, the rejection of claim 7 under 35 U.S.C. § 103 should be withdrawn because a prima facie case of obviousness has not been established based on Wu in view of Thekkath where the combination of Wu and Thekkath does not teach or suggest all elements of claim 7.

Claims 4, 14, 25, and 29

As demonstrated in the foregoing arguments with respect to claim 1, Wu does not disclose or suggest all of the elements of claim 4, namely, "...wherein each one of the objects corresponds to a different portion of the virtual volume, and wherein the objects are distributed across more than one processor in a virtualization layer," and

"generating an overall snapshot of the virtual volume from the set of partition snapshots." Kleinschnitz does not make up for the deficiencies of Wu because Kleinschnitz does not disclose or suggest these elements.

Kleinschnitz discusses storing image files in an image database, but does not disclose or suggest that an image file may be distributed across more than one processor in the virtualization layer. Kleinschnitz at page 6; para. 68. Kleinschnitz does not discuss a virtualization layer having more than one processor.

Kleinschnitz does not disclose or suggest "partition snapshots" as used in all of Applicants' claims. The "incremental images" of Kleinschnitz used by the Examiner as equivalent to Applicants' "partition snapshots," are snapshots taken of the same volume at a different point in time. See Office Action at 14-15; Kleinschnitz at page 1; para. 3. The "incremental images" are therefore not equivalent to Applicants' "partition snapshots," which are snapshots of a portion of the virtual volume corresponding to objects contained on the processor in a virtualization layer. Since Kleinschnitz does not disclose or suggest "partition snapshots", Kleinschnitz also does not disclose or suggest an "overall snapshot" generated from the set of partition snapshots, which is an element in each of Applicants' claims.

Since neither Wu nor Kleinschnitz disclose or suggest "...wherein each one of the objects corresponds to a different portion of the virtual volume, and wherein the objects are distributed across more than one processor in a virtualization layer," "partition snapshots," or "overall snapshots," these references cannot be combined to show obviousness of Applicants' claim 4 or any of Applicants' claims since they recite

similar elements. Therefore, the rejection of Applicants' claims under 35 U.S.C. § 103 should be withdrawn.

Claim 7

As demonstrated in the foregoing arguments with respect to claim 1, Wu does not disclose or suggest all of the elements of claim 7, namely, "generating an overall snapshot of the virtual volume from the set of partition snapshots." Thekkath does not make up for the deficiencies of Wu because Thekkath also does not disclose or suggest these elements.

Thekkath discloses a file server system that includes the capability to make snapshots. See Thekkath at Col. 13 lines 7-50. Thekkath discloses only one snapshot of an entire virtual volume. See Thekkath at Col. 13 lines 7-50. Thekkath, therefore, does not disclose or suggest a set of partition snapshots or "generating an overall snapshot of the virtual volume from the set of partition snapshots," as in Applicants' claim 7.

For at least these reasons, Wu is not combinable with Thekkath to disclose or suggest each element of claim 7 and the rejection under 35 U.S.C. § 103 should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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